Rainbow Horizontal Tunnel Furnace

1. Capabilities

The EPA Horizontal Tunnel Furnace is a bench-scale (280,000 BTU/hr) refractory lined combustor/incinerator simulator. An International Flame Research Foundation (IFRF) type movable block variable swirl burner provides near-burner zone aerodynamic simulation of various natural gas flame shapes. The unit has been used for research examining combustion/incineration of liquid fuels, liquid wastes (including aqueous wastes), metal aerosol formation, sorbent injection, and combustion modifications for NO_x control. The Horizontal Tunnel Furnace is permitted within APPCD's RCRA RD&D permitted facility, which allows research on a variety of surrogate and actual hazardous waste materials. Waste dopants in the form of aqueous solutions or organic streams may be introduced as secondary sprays within a primary natural gas or fuel oil flame. Combustion gases (O_2, CO, CO_2, THC, NO_x) and size segregated particulate samples [cascade impactor, differential mobility particle sizer (DMPS)] can be collected at various combustor and stack locations.

2. Size

IFRF burner firing rate: 280,000 BTU/hr
Front section inside diameter: 20 in.
Back section inside diameter: 10 in.
Overall length: 138 in.

3. Test Requirements

Testing requires an approved Quality Assurance Project Plan (QAPP) and a Health and Safety Protocol. Testing also requires the operation of the Wing-G Flue Gas Cleaning System (FGCS). It takes one technician to operate the FGCS, plus one engineer and one technician to operate the unit during tests. Any additional extractive sampling procedures (MM5, VOST, multi-metals train) require additional sampling technicians.

4. Raw Materials Required

Raw materials generally consist of necessary fuel and waste streams to achieve desired properties.

5. Data Produced Per Run

Data consists of strip charts with CEM data, plus tab-delimited ASCII files of the CEM and thermocouple data. The DMPS has a stand alone data acquisition system.

6. Length of Run

Sufficient time, usually one to two days, must be allowed for the system to approach thermal equilibrium after operating conditions are altered. Typically, only one experimental situation can be examined during any one eight-hour shift. The combustor is equipped with a flame safety system to allow unattended operation to maintain temperatures at night and over weekends. If extractive sampling for detailed organic analysis is to be performed, approximately one-half day of set-up and one-half day of equipment take-down time must be added.

7. Cost per Run (per day)

Operating costs of approximately $1200/day include the loaded fees of a Lead Engineer, a Unit Technician, an FGCS Technician, and other maintenance and expendable materials. Other services provided by a Sampling Technician (for non-routine chemical analysis) or materials for other analytical work are not included in this estimate.

8. Contact Person

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